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CRITIQUE OF THE FISCAL JUSTIFICATION FOR YEAR-ROUND VEHICLE REGISTRATION

MAY 1974

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May 6, 1974

The Honorable President of the Senate
The Honorable Speaker of the Assembly
The Honorable Members of the Senate and the
Assembly of the Legislature of California

Members:

Transmitted herewith is the Auditor General's report on the review of the fiscal justification used by the Department of Motor Vehicles and the Department of Finance for year-round vehicle registration. The proposed registration system, which was established by 1973 legislation, is to commence in 1975.

Prior to enactment of this legislation, the Department of Motor Vehicles and the Department of Finance conducted fiscal impact studies. The Department of Motor Vehicles' study projected a $101 million revenue increase for the three fiscal years 1974-75 through 1976-77. The Department of Finance projected a $64 million revenue increase for these three fiscal years.

The Auditor General reported that the implementation of this proposed system for fiscal year 1974-75 through 1976-77 will produce a net revenue loss of $7 million, thereby finding that the Department of Motor Vehicles' calculations were in error by $108 million and the Department of Finance calculations were in error by $71 million. This report analysis is intended to be a corrected version of the studies prepared by the Department of Motor Vehicles and the Department of Finance, and not an attempt to verify the adequacy or accuracy of the data used by the Department of Motor Vehicles and the Department of Finance.

The Auditor General, using a mathematical model to simulate the revenue impact of year-round vehicle registration, found that the fiscal justification of year-round vehicle registration was based on inadequate and inaccurate studies by the Department of Motor Vehicles and the Department of Finance. As one example of the inaccuracies, the study by the Department of Finance included December 1974 revenues twice, resulting in an overstatement of revenues of $7.7 million.

The Auditor General has recommended that legislation be enacted to delay year-round vehicle registration until valid analyses are completed to fiscally justify its implementation. The analyses should reflect corrections for identified mathematical and logic errors.

An Appendix to the report contains a description of the Auditor General's mathematical model and the computer solution, as well as a detailed analysis of the errors made in the study conducted by the Department of Finance.

Respectfully submitted,

Vincent Thomas

VINCENT THOMAS, Chairman
Joint Legislative Audit Committee

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INTRODUCTION

Chapter 889 of the Statutes of 1973 established, commencing in 1975, a year-round registration system for motor vehicles. Under such a system, motor vehicle licenses would be renewed for staggered 12-month periods (or other period decided by the Director of Motor Vehicles) rather than for a calendar year. For example, a portion of the motor vehicles in the state would be licensed from January to January, a portion from February to February, etc., rather than all vehicles being registered for the same period, i.e., the calendar year.

Prior to the enactment of this legislation, the Department of Motor Vehicles and the Department of Finance conducted analyses of the fiscal impact of year-round vehicle registration (hereafter referred to as the DMV and Finance studies). The DMV study[1] was conducted first and then the Department of Finance, which is charged with making all state revenue projections, made its own evaluation of the impact on state revenues.[2]

The DMV study indicated a $101 million revenue increase for the three fiscal years 1974-75 through 1976-77. A summary of this report[3] was issued to the Legislature on February 26, 1973, prior to the passage of Chapter 889.

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[1] "A Study and Recommendations for a Year-Round Vehicle Registration System in California", published by the Department of Motor Vehicles, January 1973.

[2] No report was published by the Department of Finance. Working papers and some summary information were made available.

[3] "Executive Summary, 1972 Year-round Registration Feasibility Study", published by the Department of Motor Vehicles.

Statements have been made relative to large revenue increases attributed to implementation of year-round vehicle registration. Specifically, at a March 24, 1973 Ways and Means hearing, the Director of Finance discussed the DMV data which had been previously furnished to the Legislature on February 26, 1973, and stated:

> "It indicates the additional revenue that will be coming in from staggered registration if they are able to start it January 1, 1975. It indicates, and it is a very complicated document, in the first six months of 1975 they would bring in $53 million additional revenue, but would forgive $50 million for a net of $2 million (sic). The second six months of 75, which becomes the first half of calendar year 75-76, they would bring in $47 million, but forgive only a million, the net result in the calendar year would be an increase in income to them of $46 million. In the second and ongoing years, the increase appears to be in the neighborhood of $51 million."

The following report is in response to a legislative request to review and critique the reported savings engendered by year-round registration. This study does not attempt to perform a total and complete analysis of revenues, cost, and registration estimates as they pertain to year-round registration. Rather, the study described in this report represents a corrected mathematical simulation model for year-round vehicle registration. All DMV and Finance estimates on average fees and vehicle registrations were accepted and used without question. Most of the DMV analysis describing the current system was also accepted without question. The study described in this report resulted in equations and rationale to project revenues to the proposed year-round registration system in a consistent manner which complies with current law. The analysis reported herein is intended to be a corrected version of the studies prepared by DMV and Finance, and not an attempt to verify the adequacy and accuracy of the data used by DMV and Finance. Therefore, any potential gains

or losses in annual revenues resulting from year-round vehicle registration could only be determined subsequent to completion of a valid analysis.

A computer simulation model was developed in order to perform the case analysis made in the DMV and Finance studies. The description of the model and the computer solution are presented in an appendix to this report. An additional seven cases were run to evaluate the sensitivity of revenue changes to changes in the system variables.

FINDINGS

THE FISCAL JUSTIFICATION OF YEAR-ROUND VEHICLE REGISTRATION WAS BASED ON INADEQUATE AND INACCURATE STUDIES BY THE DEPARTMENT OF MOTOR VEHICLES AND THE DEPARTMENT OF FINANCE

- A feasibility report on year-round vehicle registration issued by the Department of Motor Vehicles in January 1973 contains errors totaling $108 million, while a similar analysis by the Department of Finance contains errors totaling $71 million.

- The proposed year-round vehicle registration system will result in less revenue to the state in the amount of $43 million for the fiscal years 1974-76 and $3 million per year thereafter. The city and county share of the motor vehicle license fee account will increase due to higher fees and not due to accelerated collection as claimed by the Department of Motor Vehicles.

The Office of the Auditor General constructed a mathematical model to simulate the revenue impact of year-round registration. The attached appendix includes a complete description of the model, associated formulae, data inputs, and computer program used in the study.

The simulation of vehicle registration for the years 1974-75 through 1976-77 shows that the DMV estimate of revenue increases as a result of year-round registration included errors totaling $108 million, which is the difference between their stated $100,985,900 increase in revenue and the loss of $7,315,434 shown for the three years by the model prepared by the Office of the Auditor General.

The Department of Finance issued an analysis of the same situation which contains $71 million in errors, which is the difference between their stated $63,955,147(1) increase in revenue and the loss of $7,315,434 shown by our model. An analysis of the net differences between the present registration system and the proposed year-round system for all three analyses is as follows:

Fiscal Year	Account Title	Differences in Revenue Between Present and Proposed Registration System: Auditor General Study	DMV Study	Finance Study
1974-75	Motor Vehicle Account(2)	-11,832,844	- 1,850,000	- 1,155,729
	Motor Vehicle License Fee Account(3)	+ 113,058	+ 4,620,700	+ 671,045
	Year Total	-11,719,786	+ 2,770,700	- 484,684
1975-76	Motor Vehicle Account	-31,265,746	+ 6,880,200	+ 1,092,000
	Motor Vehicle License Fee Account	+ 5,183,957	+ 39,595,000	+29,068,166
	Year Total	-26,081,789	+ 46,475,200	+30,160,166
1976-77	Motor Vehicle Account	- 3,072,531	+ 8,689,000	- 221,899
	Motor Vehicle License Fee Account	+33,558,672	+ 43,051,000	+34,501,564
	Year Total	+30,486,141	+51,740,000	+34,279,665
	Three Year Total	- 7,315,434	+100,985,900	+63,955,147

(1) The Department of Finance revenue projections of $67,435,000 were adjusted for costs of collection.

(2) State funds consisting of registration and weight fees.

(3) Funds subvented to cities and counties, consisting of in lieu taxes on value of vehicle, minus expenses of collection.

Of the two studies, the Department of Finance study was a more sophisticated analysis of the fiscal impact of year-round renewal than the DMV study. Because of that, and the fact that the Department of Finance is charged with making all revenue projections for the state, only the Department of Finance projection will be analyzed in the balance of this report.

The report appendix provides an analysis of the errors in the Department of Finance Study. A summary of the major differences between the Finance study and our model is as follows:

SUMMARY OF MAJOR DIFFERENCES BETWEEN THE DEPARTMENT OF FINANCE AND AUDITOR GENERAL STUDIES

PRESENT REGISTRATION SYSTEM

Item	Cause	Amount	Effect
1.	Failure to include December 1974 new and non-resident vehicles for 13 months registration and weight fees	$11,600,000	Understatement
2.	Large mathematical error	1,000,000	Understatement
	TOTAL	$12,600,000	Understatement

PROPOSED REGISTRATION SYSTEM

Item	Cause	Amount	Effect
1.	Double accounting of revenues for December 1974	$ 7,700,000	Overstatement
2.	Failure to treat actual renewals on a consistent basis between the present and proposed systems	48,000,000	Overstatement
3.	Incorrect treatment of vehicles leaving the system in calendar year 1975	14,000,000	Overstatement
4.	Failure to consider year-round registration starts in December 1974 for new and non-resident vehicles	(10,000,000)	Understatement
	TOTAL	$59,700,000	Overstatement

Present system understatement	$12,600,000
Proposed system overstatement	59,700,000
Unaccounted for mathematical differences	-1,000,000
Change in total impact	$71,300,000

The "change in total impact" of $71,300,000 reflects the difference between the $64 million increase projected by Finance and the $7 million loss shown by our model.

In summary, our model shows that the proposed year-round registration system will produce a reduction in the state portion (Motor Vehicle Account) of revenues by $12 million and $31 million for fiscal years 1974-75 and 1975-76, and a $3 million reduction in subsequent years. The cities and counties will experience a revenue increase (Motor Vehicle License Fee Account) of $5 million in fiscal year 1975-76 and a $34 million increase in subsequent years. This occurs because revenues resulting from registration and weight fees (Motor Vehicle Account) will decrease while vehicle license fees (Motor Vehicle License Fee Account) increase. Such changes in revenue are the result of changing the system from a calendar year basis to a 12-month year without prorating the extension.

For example, under the present system, a new registrant entering in, say October, would pay an eleven dollar fee for a three-month period, then pay an additional eleven dollar fee in January for the next twelve-month period. This registrant, under the proposed year-round system, would pay an eleven dollar registration fee in October, which would not be renewed until the next October. The proposed system would, therefore, produce less revenues to the Motor Vehicle Account and, therefore, less revenue to the state. This results since the registrant would receive nine additional months (January through September) of registration for the eleven dollar fee paid.

To illustrate the effect upon the Motor Vehicle License Fee Account, which is apportioned to the cities and counties, assume a new vehicle is registered in October and the registrant pays a motor vehicle license fee based on the age of the vehicle at registration. Under the

present system the registrant will be charged three months as a new vehicle and the following January he will be charged for the next twelve-month period as a one year old vehicle at correspondingly reduced value. Under the same circumstances, but under the proposed year-round registration system, that new vehicle will be registered in October and the registrant will be charged for twelve-months as a new vehicle and therefore the Motor Vehicle License Fee Account, which is allocated to the cities and counties will receive increased revenues. This results since the registrant would be charged for nine additional months (January through September) of registration at the value of a new vehicle.

An attempt was made in Ch. 889 to fully compensate the state for this by transferring 2.2 percent of revenues from the city and county shares (Motor Vehicle License Fee Account) to the state share (Motor Vehicle Account). The 2.2 percent does not fully compensate the state since the percentage was reached as the result of an inaccurate study by the Department of Finance.

RECOMMENDATION

We recommend that legislation be enacted to delay year-round vehicle registration until valid analyses are completed to fiscally justify its implementation. The analyses should reflect corrections for mathematical errors and logic errors identified in this report. We recognize there may be potential revenue benefits to year-round registration, but such benefits can only be determined through the implementation of this recommendation.

SUMMARY OF COMMENTS OF DIRECTOR OF FINANCE AND HIS STAFF

1. In fiscal year 1976-77, based on the Auditor General's model, there will be a net revenue increase of over $30,000,000 which will continue in future years.

2. An analysis combining fiscal years 1974-75 through 1976-77 is misleading since fiscal year 1976-77 and beyond will produce a net revenue increase of over $30,000,000.

Harvey M. Rose
Auditor General

May 6, 1974

Staff: Jerry L. Bassett
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COMPARISON OF REVENUE PROJECTIONS BETWEEN THE CURRENT VEHICLE REGISTRATION SYSTEM AND THE PROPOSED YEAR-ROUND VEHICLE REGISTRATION SYSTEM

I. INTRODUCTION

The study described in this report is a result of a legislative request to critique work performed by the Department of Motor Vehicles and the Department of Finance. The approach taken was to review the objectives of their work, then review their data and mathematics to determine if the conclusions reached were justified. The objective of the analysis was to determine the revenue changes or impact if a year-round vehicle registration system replaces the current method of registration. The approach taken was first, to calculate vehicle registration projections and resultant revenues through 1977 under the current registration system. Second, the year-round registration system was assumed to be implemented in January 1975 and projected revenues were independently recalculated. The mathematical model developed here assumes that the present registration system described in the Department of Motor Vehicles and Finance analyses represents a baseline and all statistics relative to numbers of registrants and fees were accepted as correct. Equations were then independently derived which describe the proposed year-round registration system. A computer model was then written to simulate both of these registration systems in a consistent manner. The overall approach selected by the Department of Motor Vehicles and Finance studies was maintained, but all logic and mathematics errors were corrected. The resulting computer model was then used in an analysis which represents a corrected version of the Department of Motor Vehicles and Finance studies, and is not represented as

"the correct" analysis of the revenue impact of year-round registration. This computer model could be modified for such a study if the appropriate registration statistics were available.

II. TECHNICAL DISCUSSION

The study of vehicle registration is a complex one involving many variables. The three classes of vehicles which were included are autos, trucks, and trailers. Registrations include renewals, new vehicles, and non-resident vehicles registering for the first time in the state. The three types of fees collected are registration fees, weight fees, and vehicle license fees. The first two types of fees are placed in the Motor Vehicle Account of the Transportation Tax Fund which is designated for state use. The vehicle license fees are placed in the Motor Vehicle License Fee Account of the Transportation Tax Fund and is primarily for use by the cities and counties. When the above factors are considered in an analysis, approximately 100,000 individual calculations are required per case evaluated. Such an analysis is near-impossible to perform by manual methods such as used in the Department of Motor Vehicles and Finance studies. The study described in this report was performed with the use of a digital computer.

A. Computer Program Description

A computer program was written in support of the analysis for comparison of revenue projections between the present and proposed vehicle registration systems. The program was written in Fortran IV and the logic was developed in a generalized manner for ease of modification. The program was designed to expedite the evaluation of many alternatives relative to possible strategy changes for year-round registration. Many alternatives may be evaluated by changing input constants, others by

changing "flags", and still others by slight program modification. The computer program was written in double-precision arithmetic in order to accurately evaluate calculations involving very large numbers. The program contains almost 4,000 source statements and is comprised of a main, or driver program, and eight subroutines. Compilation using IBM's Fortran G Compiler requires 162,000 bytes of memory and execution is performed in 184,000 bytes.

The following discussion relates to the various aspect of the computer program.

1. Number of Vehicles

   a. Present System

   The number of vehicles due to register on January 1 of each year as projected by Finance was assumed as correct and used as a baseline. The number of new and non-resident registrants was also assumed as correct. The equation governing the flow of renewal vehicles in the current system becomes:

$$RD_i - \int_0^{12} \ell(t)\,dt + \int_{-1}^{11} a(t)\,dt = RD_{i+1} \tag{1}$$

   which can be approximated by:

$$RD_i - \sum_{j=1}^{12} \ell_{i,j} + \sum_{j=1}^{11} a_{i,j} + a_{i-1,12} = RD_{i+1} \tag{2}$$

   Where: RD = renewals due to register on January 1

   ℓ = vehicles leaving the system in a given month

   a = vehicles added to the system in a given month, new and non-resident

   i = the ith calendar year

   j = the jth month in the ith year.

The above equation is like a "conservation of mass" equation, and, when used, all items are accounted for with nothing being created nor destroyed. All items in the above equation were obtained directly from the Finance working papers except the number of vehicles leaving. Equation (2) was used to determine the number of those vehicles leaving the system in a given year, then l_i was assumed to be one twelfth of this value (the same number of vehicles leave the system in any month within a given year).

The following tables summarize the data used in the study.

Table 1.A.

NUMBERS OF AUTOS DUE TO RENEW

Year	i	RDi	RDi+1	$\sum_{j=1}^{11} n_{i,j}$	$n_{i-1,12}$	$\sum_{j=1}^{11} nr_{i,j}$	$nr_{i-1,12}$	L_i
1974	1	10,135,662	10,435,512	1,091,222	83,600	218,174	16,024	1,109,170
1975	2	10,435,512	10,755,232	1,058,230	87,780	213,532	16,826	1,056,648
1976	3	10,755,232	11,087,940	1,104,240	91,770	213,532	16,468	1,093,302
1977	4	11,087,940	11,416,217	1,153,931	95,760	213,532	16,468	1,151,414

Where: n = new vehicles

nr = non-resident (a = n + nr)

L = vehicles leaving the system in a twelve month-period

TABLE 1.B.

NUMBERS OF TRUCKS DUE TO RENEW
REGISTRATION - PRESENT SYSTEM

Year	i	RDi	RDi+i	$\sum_{j=1}^{11} n_{i,j}$	$n_{i-1,12}$	$\sum_{j=1}^{11} nr_{i,j}$	$nr_{i-1,12}$	L_i
1974	1	1,933,404	2,088,279	242,034	16,790	81,210	17,560	202,719
1975	2	2,088,279	2,238,335	260,652	17,966	73,089	18,790	220,430
1976	3	2,238,335	2,391,598	279,270	19,348	73,089	16,911	235,355
1977	3	2,391,598	2,582,985	297,888	20,730	73,089	16,911	217,231

TABLE 1.C.

NUMBER OF TRAILERS DUE TO RENEW
REGISTRATION - PRESENT SYSTEM

Year	i	RDi	RDi+i	$\sum_{j=1}^{11} n_{i,j}$	$n_{i-1,12}$	$\sum_{j=1}^{11} nr_{i,j}$	$nr_{i-1,12}$	L_i
1974	1	1,473,628	1,578,530	162,046	7,504	135,904	18,015	218,567
1975	2	1,578,530	1,698,320	171,579	7,954	144,672	19,096	223,511
1976	3	1,698,320	1,815,559	181,111	8,421	153,440	20,328	246,061
1977	4	1,815,559	1,944,733	190,643	8,889	162,208	21,560	254,126

All new and non-residents actually register when shown as due, but this is not true for renewals. All renewals are due to register on January 1, but some register early, and many register late. The schedule on Table 2 shows the percent of actual registrations which occur both earlier and later than due.

TABLE 2

SCHEDULE OF ACTUAL EARLY AND LATE REGISTRATIONS

Month Registered	Period	Percent of Vehicles Due to Register: Autos	Trucks	Trailers
December	i-1	1.4478	1.0285	1.3082
January	i	60.7761	57.3973	63.9495
February	i+1	29.8128	32.7670	25.5737
March	1+2	2.7712	2.4520	1.9919
April	1+3	1.4306	1.5913	1.4514
May	i+4	0.9604	1.1309	1.2412
June	i+5	0.6602	0.8307	1.0410
July	i+6	0.4702	0.7006	0.9108
August	i+7	0.3602	0.5705	0.7407
Septermber	i+8	0.2501	0.4203	0.4804
October	i+9	0.2101	0.3403	0.3303
November	i+10	0.8504	0.7706	0.9809
		100.0000	100.0000	100.0000

New and non-resident vehicles register when due, but unequal numbers register each month. Table 3 shows the distribution by month of registration.

TABLE 3

SCHEDULE OF NEW AND NON-RESIDENT REGISTRATIONS

Month Registered	Period	Autos New	Autos Non-Resident	Trucks New	Trucks Non-Resident	Trailers New	Trailers Non-Resident
		PERCENT OF REGISTRATIONS BY MONTH					
January	i	7.67	15.50	6.57	17.95	5.52	21.50
February	i+1	6.79	12.64	6.24	16.60	6.27	20.46
March	i+2	9.09	13.93	9.35	12.17	9.56	18.76
April	i+3	8.45	10.69	9.18	6.67	9.56	6.46
May	i+4	8.23	6.41	9.27	4.39	10.53	4.02
June	i+5	9.04	5.96	10.00	3.32	11.20	2.64
July	i+6	8.65	5.68	9.74	4.35	10.51	2.52
August	i+7	7.88	6.01	8.43	4.31	9.76	2.58
September	i+8	7.83	5.43	7.36	3.05	8.29	1.70
October	i+9	9.42	5.48	8.45	3.00	7.29	1.70
November	i+10	8.97	5.11	8.50	5.40	6.83	5.34
December	i+11	7.98	7.16	6.91	18.79	4.68	12.32
		100.00	100.00	100.00	100.00	100.00	100.00

b. Proposed System

The "continuity" equation for the proposed year-round registration system was modified to account for unequal numbers of new and non-resident vehicles entering the system each month. The renewals due under either the present system or the proposed system are identical through July 1975. The following equations apply for renewals due in a given month beyond that date:

Aug. '75 $$r_{20} = \left(RD_{75} - \sum_{i=13}^{19} \ell_i\right) \div 12$$

Sep. '75 $$r_{21} = \left(RD_{75} - \sum_{i=13}^{20} \ell_i\right) \div 12$$

$$\vdots$$

Nov. '75 $$r_{23} = \left(RD_{75} - \sum_{i=13}^{22} \ell_i\right) \div 12$$

Dec. '75 $$r_{24} = \left(RD_{75} - \sum_{i=13}^{23} \ell_i\right) \div 12 + a_{12}$$

Jan. '76 $$r_{25} = \left(RD_{75} - \sum_{i=13}^{24} \ell_i\right) \div 12 + a_{13}$$

$$\vdots$$

Nov. '76 $$r_{35} = \left(RD_{75} - \sum_{i=13}^{34} \ell_i\right) \div 12 + a_{23}$$

Dec. '76 $$r_{36} = \left(RD_{75} - \sum_{i=13}^{35} \ell_i\right) \div 12 + a_{24} + a$$

Jan. '77 $$r_{37} = \left(RD_{75} - \sum_{i=13}^{36} \ell_i\right) \div 12 + a_{25} + a_{13}$$

$$\vdots$$

Nov. '77 $$r_{47} = \left(RD_{75} - \sum_{i=13}^{46} \ell_i\right) \div 12 + a_{35} + a_{23}$$

Dec. '77 $$r_{48} = \left(RD_{75} - \sum_{i=13}^{47} \ell_i\right) \div 12 + a_{36} + a_{24} + a_{12}$$

(3)

Where: r_i = renewals due to month i. If i = 1, renewals are for January 1974; i = 2 is for February 1974 · · · i = 48 is for December 1977.

RD_{75} = Renewals due on January 1, 1975.

ℓ_i = Vehicles leaving the system in the ith month.

a_i = Vehicles added to the system in the ith month - new and non-residents.

Finance assumed that all renewal vehicles actually registered when due, which is inconsistent with their treatment of the current system. The actual renewal cycle for the proposed year-round registration system will probably be slightly different than the current system since late registration penalties have been changed. The renewal cycle shown in Table 2 was used in this study since no other data was available.

2. Revenue Estimates

a. Present System

Revenue estimates in the current system are based on the assumption that all renewal vehicles are due to register on

January 1 of each year and pay an "average" fee which varies with calendar year. The following fee schedule was used.

TABLE 4

SCHEDULE OF RENEWAL, NEW, AND NON-RESIDENT REGISTRATION FEES

Calendar Year	Autos	Trucks	Trailers
All years	$11.12	$11.00	$11.00

The following schedule was used for vehicle license fees:

TABLE 5

SCHEDULE OF RENEWAL, NEW, AND NON-RESIDENT VEHICLE LICENSE FEES

	Autos			Trucks			Trailers		
Year	Renewals	New	Non-Resident	Renewals	New	Non-Resident	Renewals	New	Non-Resident
1974	16.00	62.91	30.98	17.98	79.90	17.08	14.20	59.14	5.88
1975	16.00	66.68	32.84	18.16	83.89	17.93	14.20	65.21	5.88
1976	16.00	70.69	34.81	18.35	88.08	18.83	14.20	68.47	5.88
1977	16.00	74.93	36.89	18.53	92.49	19.77	14.20	71.89	5.88

Table 6 shows the weight fee schedule used in this analysis.

TABLE 6

SCHEDULE OF RENEWAL, NEW, AND NON-RESIDENT WEIGHT FEES

	Trucks			Trailers		
Year	Renewals	New	Non-Resident	Renewals	New	Non-Resident
All years	41.00	41.00	41.00	14.26	14.26	14.26

New and non-resident vehicles pay the full registration fee upon entering the system, irrespective of the month they register. They will however, pay a prorata share of the weight and license fee depending on the month they register. Those vehicles which register in December pay fees for 13 months and do not become renewals until January in the second following year.

b. Proposed System

The fees presented in Tables 4, 5, and 6 were also used in the proposed year-round registration system. The method of application of these fees was somewhat different. The year-round system was assumed to start in December 1974 for new and non-resident vehicles, while it begins in January 1975 for renewals. Revenues are the same for both systems through November 1974. New and non-resident registrants register for 12 months starting in December 1974. Renewals scheduled for January 1975 will pay fees for seven through 18 months. One-twelfth of these vehicles will begin the next renewal cycle on August 1, 1975, while the remaining vehicles will renew at one-month intervals. All analyses described in this study assumed that renewal registrations occur 12 times in a given year. The actual system will use 120 renewal periods per year. Evaluation of the two systems on a consistent basis should include one renewal due date for the present system and 120 renewal due dates for the proposed system.

B. Study Results

The study by Finance was performed using manual methods, while the Auditor General's study was done with the aid of a digital computer. A complete listing of the Fortran compilation is presented at the back

of this report as Table 7. Table 8, also at the back of this report, is a complete summary of the computer solution to revenue projections and impact analysis for the present and proposed systems through calendar year 1977.

Page 2 of Table 8 shows all details of auto registration for both the present and proposed systems for the 48-month period from January 1974 through December 1977. Data are presented for renewals, both due and actual, as well as new and non-resident registrations. These same data are seen for trucks and trailers on pages 3 and 4 of Table 8. These registration data are summarized by calendar year and fiscal year on pages 5,6 and 7 for autos, trucks, and trailers. Page 8 shows detailed projected auto registration revenues for each of the 48 months for renewals, new, and non-resident vehicles for the present and proposed systems. The last column of this page shows a month-by-month difference in revenues between the present and proposed systems. Similar data are presented for trucks and trailers on pages 9 and 10. Pages 11 and 12 summarize weight fee revenue data for trucks and trailers in a format similar to the preceding pages. Pages 13, 14 and 15 are a similar presentation of vehicle license fee revenues for autos, trucks, and trailers. A detailed summary of auto revenues by calendar and fiscal year including registration, weight, and vehicle license fees is presented on page 16. These data are presented for the present system, the proposed system, and the difference between the two. The same type of summary data are seen on pages 17 and 18 for trucks and trailers. Page 19 shows all projected revenues summarized by account, for each fiscal year of interest. This page includes the present system, the proposed system, and differences between the two. The final page shows the impact on each account (Motor Vehicle Account and Motor Vehicle License Fee Account) when the 2.2 percent transfer is applied. Page 20 shows that, if the proposed year-round system is implemented as planned, the state portion

of revenues (Motor Vehicle Account) will be reduced by $11.8, $31.3, and $3.1 million for the three fiscal years studied. The transition to year-round registration will have been completed prior to FY 76-77 and, consequently, the $3.1 million reduction in revenues will also occur in subsequent years. There will be a revenue increase to the cities and counties' portion (Motor Vehicle License Fee Account) of $0.1, $5.2, and $33.6 million for the three years studied. The net change in total revenues for both accounts is a revenue loss of $11.7 and $26.1 million the first two fiscal years and a revenue increase of $30.5 million the third and subsequent years. This is a net loss of revenue of $7.3 million over the three years.

C. Comparison Between Auditor General and Finance Studies

The following discussion presents the more important differences between the Auditor General and the Finance studies.

a. Present Registration System

(1) Number of Vehicles

The Auditor General study and Finance study used the same numbers, since it was assumed that vehicle registration projections for the current system through 1977 would be baseline.

(2) Revenue Projections

(a) Registration Fees

Finance understated revenues for new and non-resident registration fees by a total of $5.8 million for the three fiscal years under consideration. New and non-resident vehicles which register in December pay fees for 13 months. Registration fees are not

prorated and consequently these vehicles pay two registration fees, that is $11 for December plus $11 for the next 12 months. The Finance study considered the 13-month registration only for the vehicle license fee, and neglected to include this for registration of weight fees.

(b) Weight Fees

Finance understated revenues for new and non-resident weight fees by $5,800,000 for fiscal years 1974-75, 1975-76, 1976-77. This understatement results from failure to consider the December registrants as described above.

(c) Vehicle License Fees

Finance understated revenues for vehicle license fees by $1 million due to an addition error. Numerous other mathematics errors were discovered which resulted in an overstatement of revenues of $174,000.

b. Proposed Registration System

(1) Number of Vehicles

Equations (2) and (3) were used to estimate the number of vehicles due to register at a particular point in time. Actual registrations differ somewhat from due registrations since some vehicles are registered early, some on time, and some late. Finance used a schedule for actual registrations for the current system in which 1.45 percent register in December, 60.78 percent register in January, 29.81 percent register in February, and so on with 0.85 percent register in November. They assumed, however, that all vehicles

actually register when due in their analysis of the proposed system. This assumption is unrealistic and inconsistent with their treatment of the analysis of the current system. The inclusion of this refinement would have increased the number of calculations in this phase of analysis by a factor of 12 and would have greatly complicated their manual calculations. The inclusion of this item in the Auditor General computer study merely amounted to the addition of another loop.

(2) Revenue Projections

(a) Registration Fees

Finance overestimated revenues by $3.5 million due to double addition of the month of December 1974. In their analysis they assumed that revenues for January 1974 through December 1974 were the same for the present and proposed system. They then calculated a "lump sum" receipt of revenues for January 1975 which is the period when all renewal vehicles are due to begin year-round registration. December 1974 represents a prepayment of a fraction of renewals which are due on January 1, 1975 for the current system. By adding this month's revenue to the proposed system calculation which includes a "lump sum" for all due vehicles, December 1975 revenues are therefore added twice.

The Finance study indicated too few vehicles left the system during the 1975 calendar year and consequently they overstated revenues by $4.4 million.

Finance's failure to consider the present and proposed systems on the same basis results in an overstatement of revenues for year-round registration of $14.4 million. This is due to the fact that some vehicles will register late and this $14.4 million will actually be revenue in a later period.

(b) Weight Fees

Year-round registration actually starts in December 1974 for new and non-resident vehicles, while it begins in January 1975 for renewals. The December 1974 new and non-resident registrants will pay fees for 12 months and then will renew in December 1975. Finance's failure to consider this produces an understatment of revenue of $2.3 million.

The Finance study overstated revenues by $1.1 million due to double addition of renewals for December of 1974 as explained above.

Finance overstated revenues by $10.1 million due to inconsistent treatment of actual renewals between the two systems as explained above.

The Finance study overestimates revenues by $2.9 million as a result of their miscalculation of vehicles leaving the system in the 1975 calendar year.

(c) Vehicle License Fees

Finance neglected the fact that year-round registration begins in December 1974 for new and non-resident vehicles and consequently understated revenues by $7.7 million.

The Finance study added the December 1974 renewals twice as explained above, producing an overstatement in revenues of $3.1 million.

An overstatement in revenues of $23.5 million results from the fact that Finance assumed all renewals occur when due in the proposed system which is inconsistent with how they evaluated the present system.

The Finance study overstated revenues by $6.7 million which is due to their erroneous estimate of vehicles leaving the system in 1975.

A summary of each of these revenue changes is presented in Table 3 along with the change in impact between the Financ and Auditor General studies. The $71 million change in impact agrees with Table 9 which shows that Finance predicts a revenue increase of $64 million, while this study projects a revenue loss of $7 million.

TABLE 9

SUMMARY OF MAJOR DIFFERENCES BETWEEN THE DEPARTMENT OF FINANCE AND AUDITOR GENERAL STUDIES

PRESENT REGISTRATION SYSTEM

Item	Cause	Amount	Effect
1.	Failure to include December 1974 new and non-resident vehicles for 13 months registration and weight fees.	$11,600,000	Understatement
2.	Large mathematical error	1,000,000	Understatement
	TOTAL		
	TOTAL	$12,600,000	Understatement

PROPOSED REGISTRATION SYSTEM

Item	Cause	Amount	Effect
1.	Double accounting of revenues for December 1974	$ 7,700,000	Overstatement
2.	Failure to treat actual renewals on a consistent basis between the present and proposed systems	48,000,000	Overstatement
3.	Incorrect treatment of vehicles leaving the system in calendar year 1975	14,000,000	Overstatement
4.	Failure to consider year-round registration starts in December 1974 for new and non-resident vehicles	(10,000,000)	Understatement
	TOTAL	$59,700,000	Overstatement

Present system understatement	$12,600,000
Proposed system overstatement	59,700,000
Unaccounted for mathematical differences	- 1,000,000
Change in total impact	$71,300,000

D. Revenue Differences Between Present and Proposed Systems

The foregoing analysis was made to indicate what changes must be made to the Finance and Department of Motor Vehicles studies in order for the results to be consistent between the present system and the proposed year-round vehicle registration systems.

The following analysis is presented to indicate specifically to what factors are attributed the revenue changes between the present and proposed systems.

a. Registration Fees

The proposed year-round registration system will produce a revenue reduction of $43 million for the first three fiscal years when compared to the present system. Without the 10 percent forgiveness in January 1975, the loss in revenue would have been $26 million. The yearly loss in revenue from registration fees will be about $11 million after the transition phase of year-round registration. The following equations explain the reason.

The present system yearly revenue due to registration fees for new and non-resident vehicles is:

$$T_{cj} = \sum_{i=1}^{12} (an_{i,j})(fa) \tag{4}$$

The proposed system revenue is:

$$T_{pj} = \sum_{i=1}^{12} (an_{i,j})(fa)\ \frac{(13-i)}{12} \tag{5}$$

The three-year difference in revenue becomes:

$$\begin{aligned} R_c = & \sum_{j=1}^{3} \sum_{i=1}^{12} (na_{i,j})(fa)\frac{(13-i)}{12} - \sum_{j=1}^{3} \sum_{i=1}^{12} (na_{i,j})(fa) \\ & + \sum_{j=1}^{3} \sum_{i=1}^{12} (nk_{i,j})(fk)\frac{(13-i)}{12} - \sum_{j=1}^{3} \sum_{i=1}^{12} (nk_{i,j})(fk) \\ & + \sum_{j=1}^{3} \sum_{i=1}^{12} (n\ell_{i,j})(f\ell)\frac{(13-i)}{12} - \sum_{j=1}^{3} \sum_{i=1}^{12} (n\ell_{i,j})(f\ell) \end{aligned} \tag{6}$$

$Rc = -32{,}700{,}000$

Where Tcj = total license fee revenue for the present system in year j.

Tpj = total license fee revenue for the proposed system in year j.

an = monthly new and non-resident autos.

ak = monthly new and non-resident trucks.

al = monthly new and non-resident trailers.

fa = license fee cost factor for autos.

fk = license fee cost factor for trucks.

fl = license fee cost factor for trailers.

i = the i^{th} month.

j = the j^{th} year.

Rc = revenue change between the two systems.

The above equation assumes that, for the January 1975 implementation period for year-round renewals, a registrant will pay a prorata share of one-twelfth of the $11 fee for each month of registration. The Finance study assumed a payment of $1 per month with a maximum of $11 for any 12-month period. It is not clear if this was a simplification for manual calculations or if this will be the collection method used in the real system. The following equation is a correction factor for this additional revenue:

$$cf = \frac{\sum_{i=7}^{18} \left(\frac{i}{12}\right)(11)}{11 + \sum_{i=7}^{17} i} \qquad (7)$$

$$R_{cf} = (cf-1)\left[(ra_{1,75})(fa) + (rk_{1,75})(fk) + (r\ell_{1,75})(f\ell)\right] = \$6,000,000 \qquad (8)$$

where:

cf = correction factor

$ra_{1,75}$ = auto renewals in January 1975.

$rk_{1,75}$ = truck renewals in January 1975.

$rl_{1,75}$ = trailer renewals in January 1975.

Rcf = revenue correction factor.

The net revenue loss for the first three fiscal years is therefore approximately $32.7 million less $6 million plus $16.7 million for forgiveness for a total revenue loss of $43,3 million.

b. Weight Fees

The proposed system will produce a loss in revenue for the first three years of approximately $16 million which is primarily due to forgiveness. There will be very little difference in weight fee revenues between the two systems after the initial transition period.

c. Vehicle License Fees

The study indicates the proposed system will produce a revenue increase of $54 million over the first three fiscal years. This figure would have been $78 million without the $24 million

forgiveness. Indications are that there will be a $42 million yearly revenue increase in each year subsequent to full implementation of year-round registration.

The mathematical model based on Department of Finance assumptions, indicates that the entire revenue gain is due to new and non-resident registrations and none is due to renewals. This is totally in error. In fact, only $9 million per year is due to new vehicles, while a large but undeterminable amount is due to renewal registrations. The amount of revenue increase due to renewals could be calculated if the statistics generated by Finance were in the proper form as will be explained later.

When considering new vehicles in year-round registration, Finance assumed each vehicle paid for 12 months at the new car rate, which is close to $70 for autos. These same vehicles, when evaluated in the current system, will pay a fraction of 12 months (to the end of the calendar year) at the new car rate, then start paying fees at the "average" license fee rate of $16 per year.

In order to treat these new vehicles on the correct basis, (a) the proposed system should charge fees for 12 months as a new car, while the current system should (b) charge a fraction of 12 months as a new car, and the rest of the twelve-month period as a one year old car. The fees for a one year old car should have been $70 x .70/.85 or $58 instead of $12 as used in this study.

Fees for registrations of new vehicles are based on 85 percent of market value, while one year old cars use 70 percent.

The Finance study used a $16 average vehicle license fee for renewals in both systems, which is obviously wrong. Characteristics of renewal vehicles are different between the present and proposed system and each should have a different average registration rate. The year-round renewal group will have fewer new vehicles because they preregister for one year. New vehicles in the current system register initially from two to 13 months, then they are in the renewal group. The proposed system of year-round registration indicates that vehicles pay for 12 months' fees based on the value of the car at the time of registration. For example, if a two-year old car is registered in June, the vehicle license fee will be for 12 months, or until next June as a two-year old car. The current system would collect revenues from July to December as a two-year old car, then the vehicle license fee would drop since the car would be considered a three-year old car. It is obvious from the foregoing that the same average vehicle license renewal fee rate of $16 per year should not be used for both the present and proposed systems. It would produce a more valid analysis if the renewals were classified by age group each with their respective fees rather than using the $16 average. Such a refinement would be rather simple using a computer mode, but near-impossible using manual methods.

The following equation is an approximation of the Finance method for estimating increased revenues due to new and non-resident vehicles.

$$R = \sum_{i=1}^{11} (na_i)(fa-fav)(i-1) + \sum_{i=1}^{11} (nra_i)(fna-fav)(i-1)$$

$$+ \sum_{i=1}^{11} (nk_i)(fk-fkv)(i-1) + \sum_{i=1}^{11} (nrk_i)(fnk-fkv)(i-1) \qquad (9)$$

$$+ \sum_{i=1}^{11} (n\ell_i)(f\ell-f\ell v)(i-1) + \sum_{i=1}^{11} (nr\ell_i)(fn\ell-f\ell v)(i-1)$$

R = $42 million

Where R = revenue increase of proposed compared to current systems

na = new autos for i^{th} month.

nra = non-resident autos for i^{th} month.

nk = new trucks for i^{th} month.

nrk = non-resident trucks for i^{th} month.

nl = new trailers for i^{th} month.

nrl = non-resident trailers for i^{th} month.

fa = new auto vehicle license fee.

fna = non-resident auto vehicle license fee.

fav = average auto vehicle license fee for renewals

fk = new truck vehicle license fee.

fnk = non-resident truck vehicle license fee.

fvk = average truck vehicle license fee for renewals.

fl = new trailer vehicle license fee.

fnl = non-resident trailer vehicle license fee for renewals.

An approximate equation for the correct revenue increase for new vehicles is:

$$R = \sum_{i=1}^{11} (na_i)(fa)(i-1)\left(1-\frac{.7}{.85}\right) + \sum_{i=1}^{11} (nk_i)(fk)(i-1)\left(1-\frac{.7}{.85}\right)$$

$$+ \sum_{i=1}^{11} (n\ell_i)(f\ell)(i-1)\left(1-\frac{.7}{.85}\right) \qquad (10)$$

$R = \$9$ million.

Statistics on the age of the non-resident and renewal vehicles are insufficient to make accurate revenue estimates, and, therefore, the real impact of this cannot be calculated.

E. Evaluation of Alternative Computer Cases

The computer model described herein was developed in a generalized form and can be used to evaluate various implementation options to year-round registration. A total of eight cases was evaluated to illustrate examples of capability and are seen as Table 8 and Tables 10 through 16. A summary of these cases is presented below.

Case 1. This case was designed to compare the present registration system to the proposed year-round system. Data from this case was used throughout the text of this report.

Case 2. This case was used to illustrate the revenue impact if the ten percent forgiveness if not applied. Forgiveness amounts to a reduction in revenue of almost $52 million. Any value of forgiveness can be evaluated in the model.

Case 3. This case illustrates the application of a different fee schedule for new and non-resident vehicles.

Case 4. Case 4 illustrates the revenue impact if there is no growth in the system during the next three fiscal years. A growth of about three percent in vehicle registration was used in Case 1. This case indicates that there will be no radical changes between the present and proposed registration systems as found in Case 1. There

will, however, be a reduction in revenue of $157 million over a three-year period under either registration system.

Case 5. Case 5 illustrates the influence when assuming all fees are paid when due for both the present and proposed registration system. This illustration produces $15.5 million more revenue than Case 1.

Case 6. This case evaluates the impact if it is assumed that equal numbers of new and non-residents enter the system each month rather than a cyclic schedule. This evaluation produces a revenue change of $7 million compared to Case 1. Cases 5 and 6 illustrate the impact of changes in assumptions on study results and reinforce the opinion of need for a refined computer analysis for decision making.

Case 7. This case illustrates the revenue impact if year-round registration is delayed from January 1975 to January 1976. Either registration implementation period will result in a revenue loss of about $37 million the first two periods of operation. The one-year delay will produce $29 million lower revenues in the three-year period through fiscal year 1976-77, and equal revenues beyond that date. If year-round registration is delayed one year and forgiveness is reduced from $52 million to $22.5 million, then revenues will be identical to those if implementation occurs in January 1975 with the proposed system.

Case 8. Case 8 assumes that the license fee value of all vehicles is reduced by ten percent. This change produces $100 million lower revenues over a three-year period compared to Case 1 for either the present or proposed registration system. This case and case 4 illustrate

the significant impact on total revenues if the nature of the statistics used in this study are changed. The energy crisis could dictate such a change in statistics.

III. SUMMARY AND CONCLUSIONS

The following are the more pertinent findings from the critique of studies for a proposed year-round vehicle registration system.

1. Claims of revenue increase in the Department of Motor Vehicles' study of $101 million over the first three fiscal years and $50 million in subsequent years are based on errors totaling $108 million. A revenue loss of $12 million and $26 million will occur the first two fiscal years, while a revenue increase of about $30 million will be obtained on the third and subsequent years. The revenue loss the first two years is due to a forgiveness in revenues of $52 million.

2. The proposed year-round registration system will produce a reduction in the state portion (Motor Vehicle Account of the Transportation Tax Fund) of revenues by $12 million and $31 million for fiscal years 1974-75 and 1975-76, and a $3 million reduction in subsequent years. The cities and counties will experience a revenue increase (Motor Vehicle License Fee Account of the Transportation Tax Fund) of $5 million in fiscal year 1975-76 and a $34 million increase in subsequent years. This results from the fact that revenues due to registration and weight fees (Motor Vehicle Account) will decrease while vehicle license fees (Motor Vehicle License Fee Account) increase. An attempt was made in Chapter 889 to equalize this somewhat by transferring 2.2 percent of revenues from the Motor Vehicle License Fee Account to the Motor Vehicle Account. The 2.2 percent does not fully accomplish the desired goal since it was based on erroneous study.

3. Increased revenues beyond the transition phase of year-round registration are due to increased fees and are not due to accelerated payments as claimed by the Department of Motor Vehicles. The Department of Motor Vehicles' study reported on page 64:

> "Due to the accelerated collections of revenue on new and non-resident transactions, there will be a substantial gain to both the Motor Vehicle Account (weight fees), approximately $9,000,000 and the Motor Vehicle License Fee Account (In-Lieu Tax), approximately $43,000,000 on a continuing basis."

All individuals (renewals, new and non-resident) whose registration occurs in any month other than January will pay more vehicle license fees over the lifetime of the vehicle. The higher fees will occur every year as long as the vehicle is registered.

4. None of the studies described herein are of sufficient sophistication to justify decisions concerning $2 billion in revenues over a three-year period. These studies provided the basis for decision making relative to the ten percent forgiveness and the 2.2 percent transfer between accounts. The studies prepared by the Department of Motor Vehicles and Finance contain errors in logic and mathematics as well as simplifying statistics and assumptions in order to make the study amenable to manual analysis. Their analysis should have been performed using a digital computer. The computerized study performed by the Office of the Auditor General is also insufficient primarily because appropriate statistics were not available. In addition, the year-round registration of autos will occur 120 times per year. All analyses described in this report assumed 12 renewal periods per year. It would have been a relatively simple matter to include 120 renewals in the computer model. A schedule of early and

late renewals was used for the present system. Some appropriate schedule should also have been used for year-round registrations. The law relative to late penalties is different between the two systems and, consequently, a different early and late renewal schedule should be used.

5. January 1975 implementation of year-round renewals is not critical as far as revenues are concerned. Under the current law, the sooner year-round vehicle registration is implemented, the sooner will be the loss in revenue of $38 million for the first two years of operation. Should other factors dictate that it is desirable that year-round registration be delayed a year, the total revenue impact can be governed by the magnitude of forgiveness, as was the case with 10 percent forgiveness in the proposed system.